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(71) Applicant
Ivan Anastasovski
Fruskogorska 33, 21000 Novi Sad, SR Srbija, Yugoslavia

(72) Inventor
Ivan Anastasovski

(74) Agent and/or Address for Service
Ivan Anastasovski
c/o Sanja Prowting, Flat B, 93 Ifield Road, London, SW10, United Kingdom

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E05B 49/04

(52) UK CL (Edition K)
E2A ALV

(56) Documents cited
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(58) Field of search
UK CL (Edition J) E2A ABC ALV
INT CL[4] E05B

(54) **Digital electronic lock**

(57) A remotely operated electronic lock (REL) uses a serially transmitted digital code to authorize actuation of the lock. The receiver of the code (5) is accessible by the operator so as to permit insertion of a code carrying member (P) e.g. key device. The decoder and actuator (REL) for the lock are within the area secured by the lock and thus cannot be tampered with and access to the leads connecting this with the receiver serves no purpose since the code must be transmitted along them. A preferred use is as a bonnet lock for a vehicle, the receiver being installed in the cab and the decoder/actuator in an inaccessible part of the engine compartment.

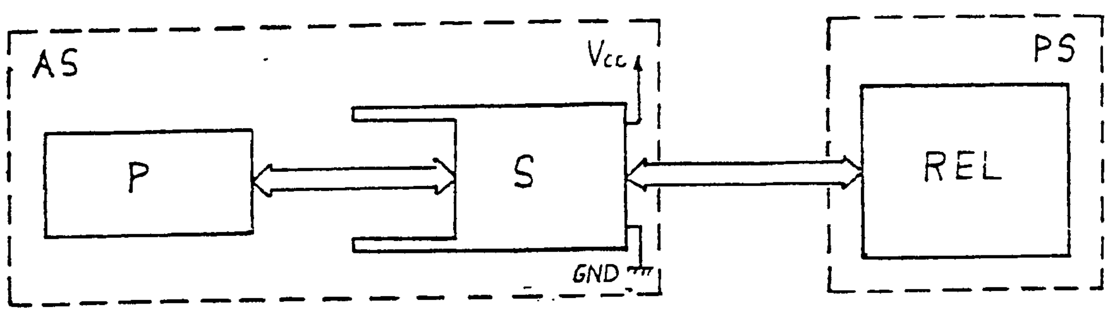

Figure 1

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1982.

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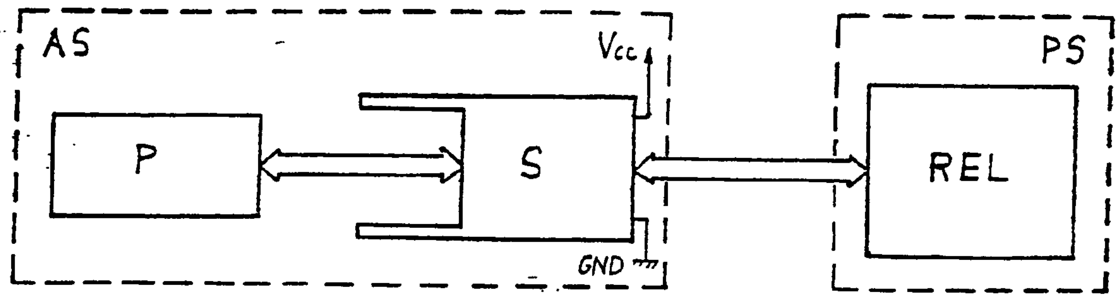


Figure 1

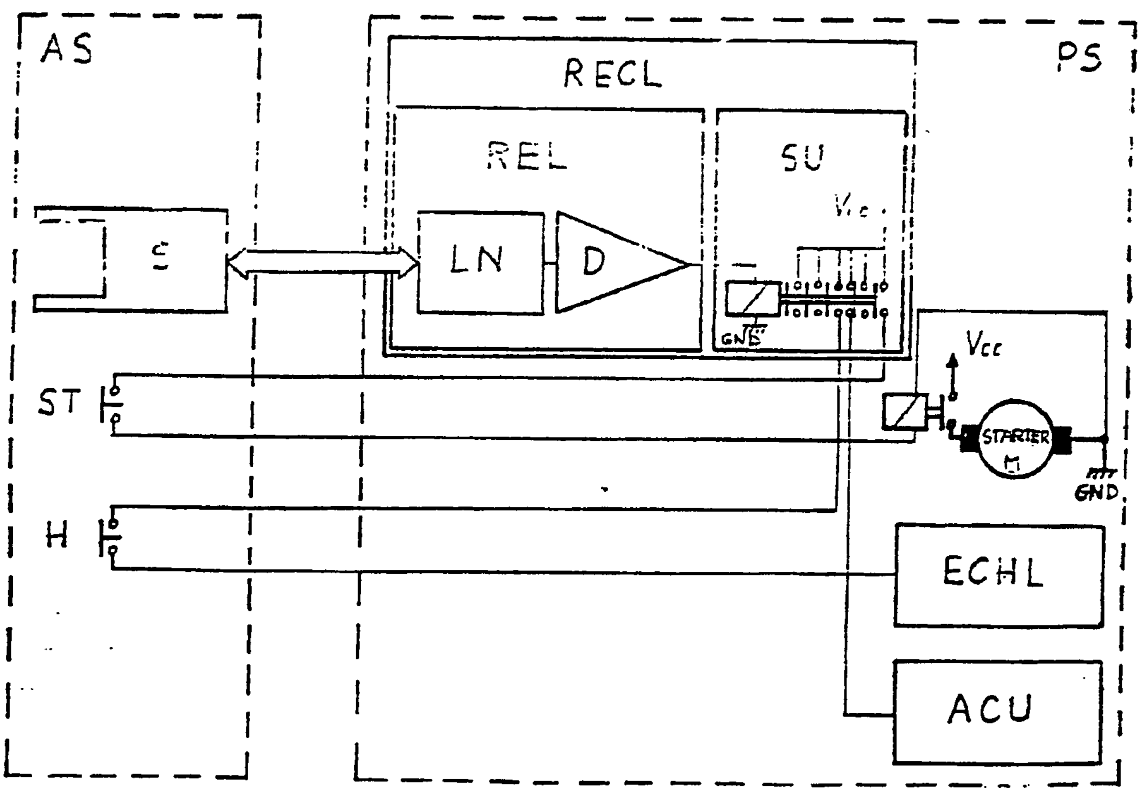
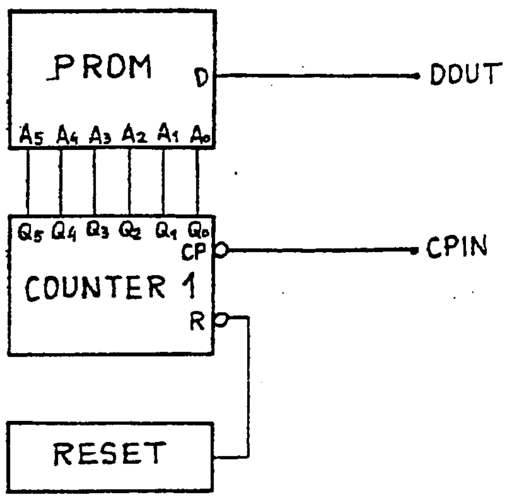


Figure 2



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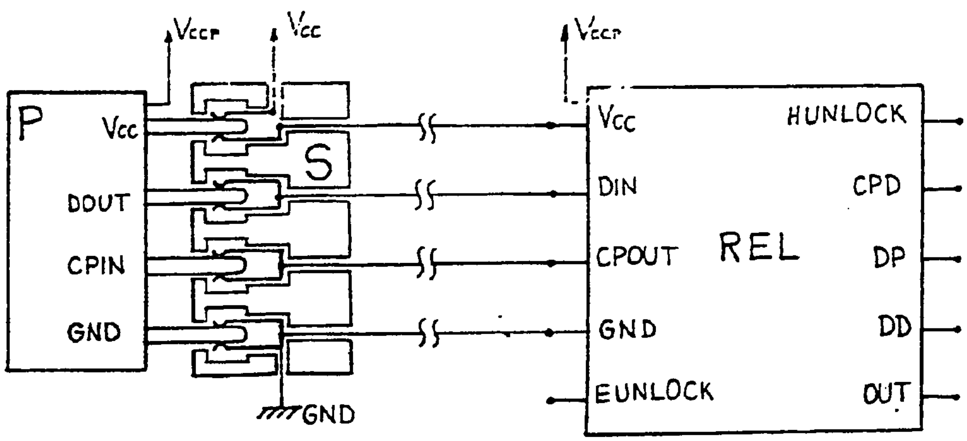

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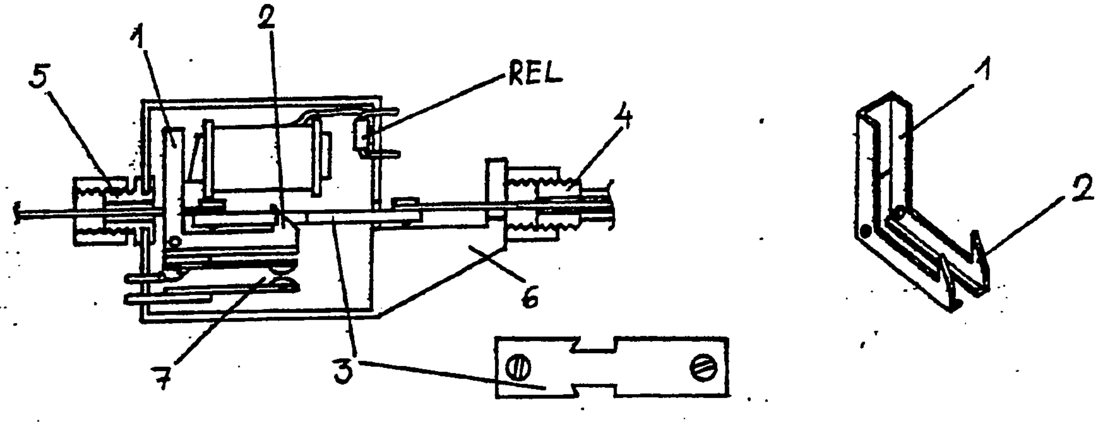

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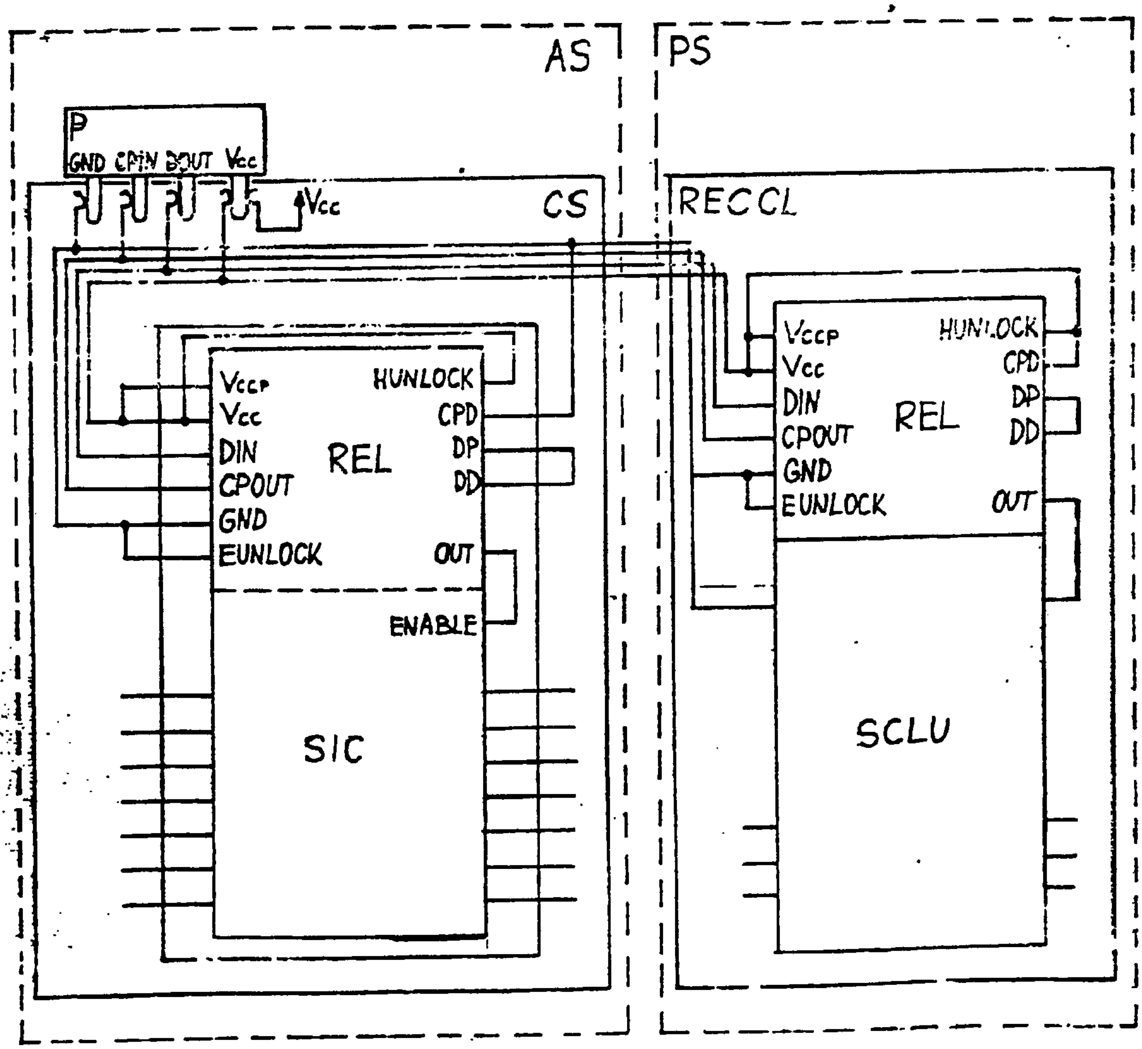

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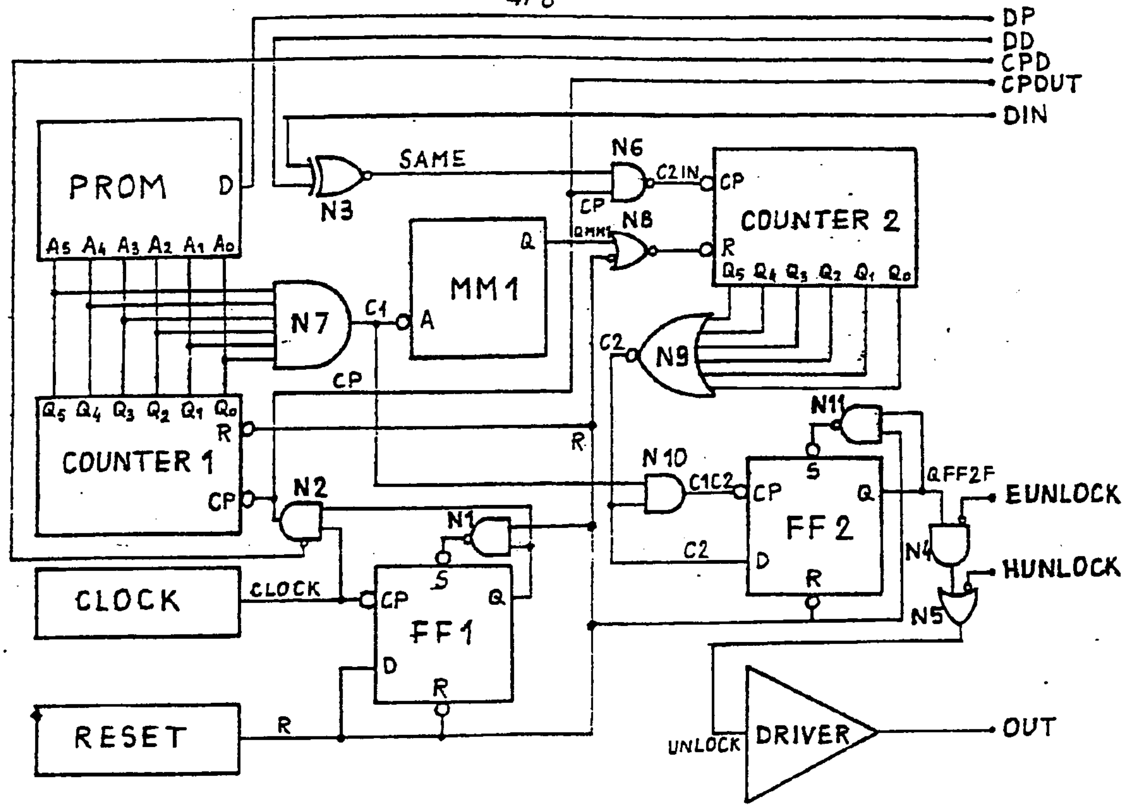
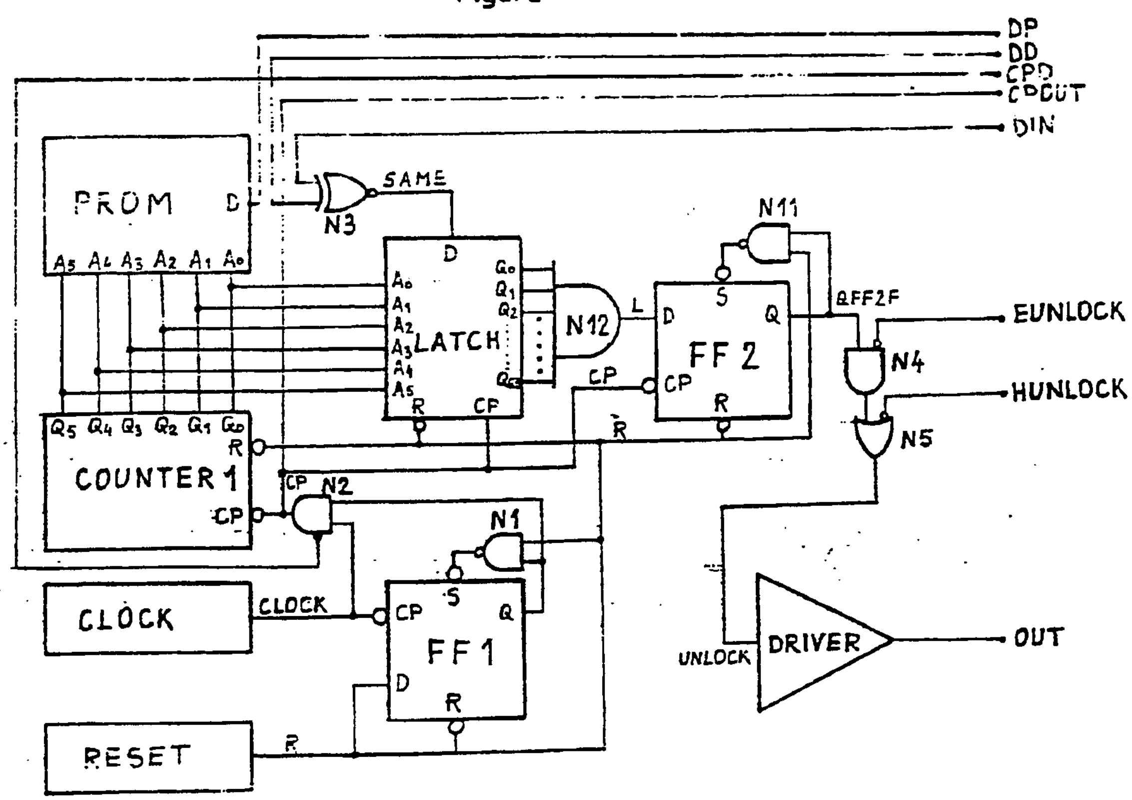


Figure 7



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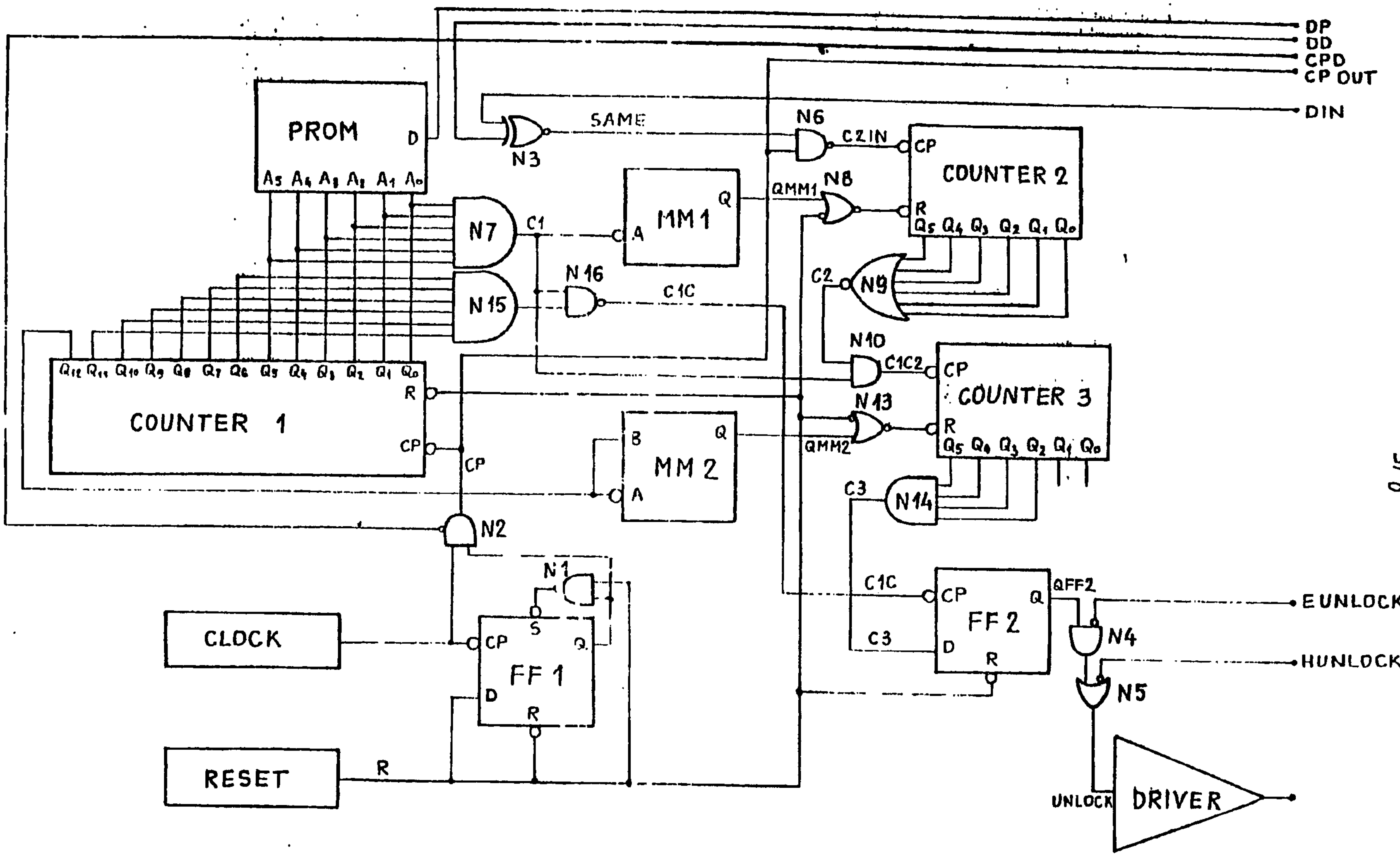
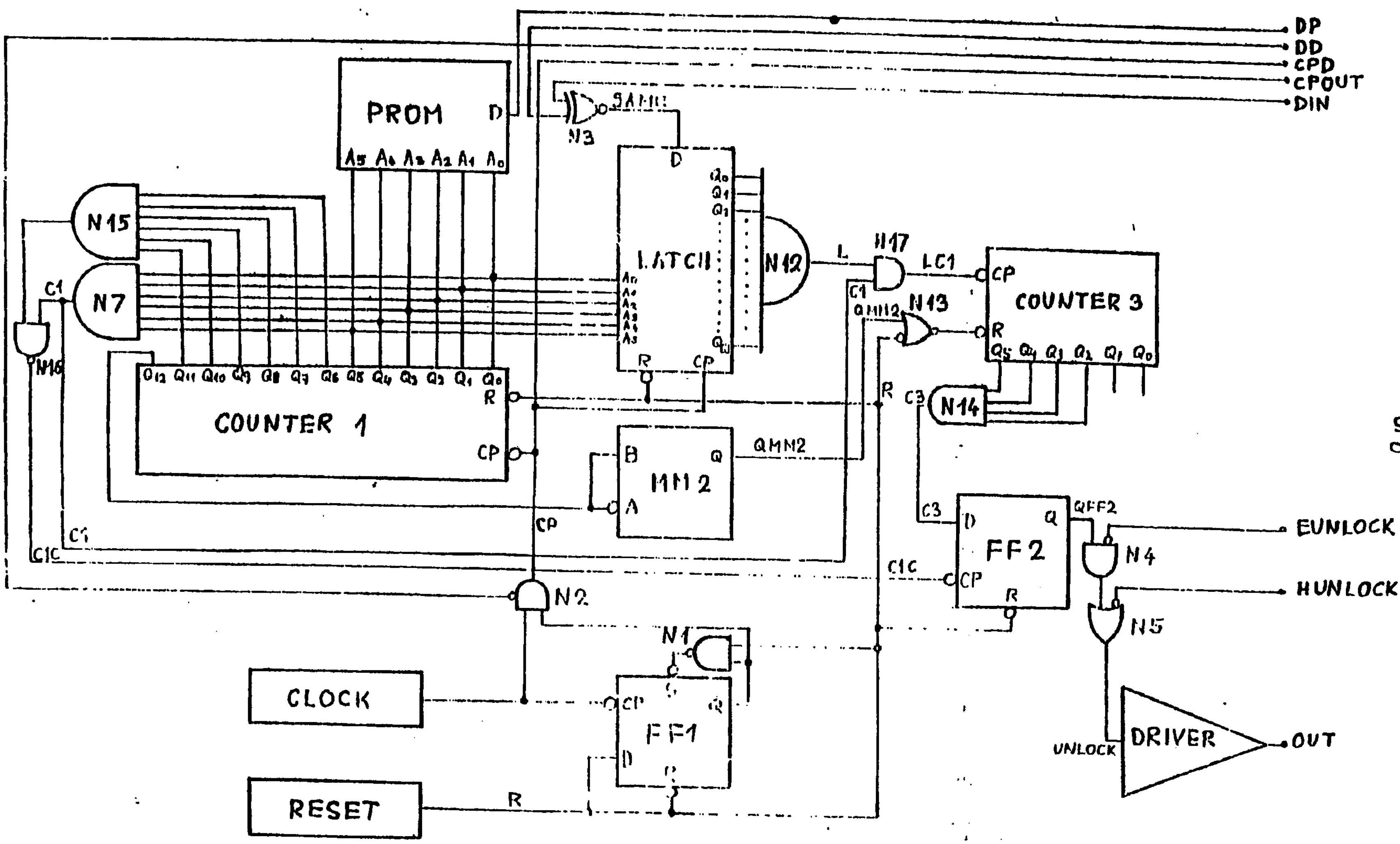


DP
DD
CPD
CP OUT
DIN
PROM
D
A5 A4 A3 A2 A1 A0
N3
SAME
N6
C2IN
COUNTER 2
CP
R
Q5 Q4 Q3 Q2 Q1 Q0
N7
C1
MM1
A
Q
QMM1
N8
N9
C2
N15
N16
C1C
N10
C1C2
COUNTER 3
N13
QMM2
N14
C3
COUNTER 1
Q12 Q11 Q10 Q9 Q8 Q7 Q6 Q5 Q4 Q3 Q2 Q1 Q0
MM 2
B
CP
N2
N1
S
FF 1
CLOCK
RESET
FF 2
QFF2
EUNLOCK
N4
HUNLOCK
N5
UNLOCK
DRIVER

Figure 9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DD
CPD
CPOUT
DIN
PROM
D
A5 A4 A3 A2 A1 A0
N3
SAME
LATCH
D
Q0
Q1
Q2
R
CP
N12
L
N17
LC1
C1
QMM2
N13
COUNTER 3
CP
R
Q5 Q4 Q3 Q2 Q1 Q0
N14
C3
N15
N7
C1
N16
COUNTER 1
Q12 Q11 Q10 Q9 Q8 Q7 Q6 Q5 Q4 Q3 Q2 Q1 Q0
R
CP
MM2
B
A
Q
QMM2
CP
C1
C1C
N2
FF2
D
Q
CP
R
QFF2
N4
EUNLOCK
HUNLOCK
N5
DRIVER
UNLOCK
OUT
N1
CLOCK
FF1
CP
D
Q
RESET
R

Figure 10

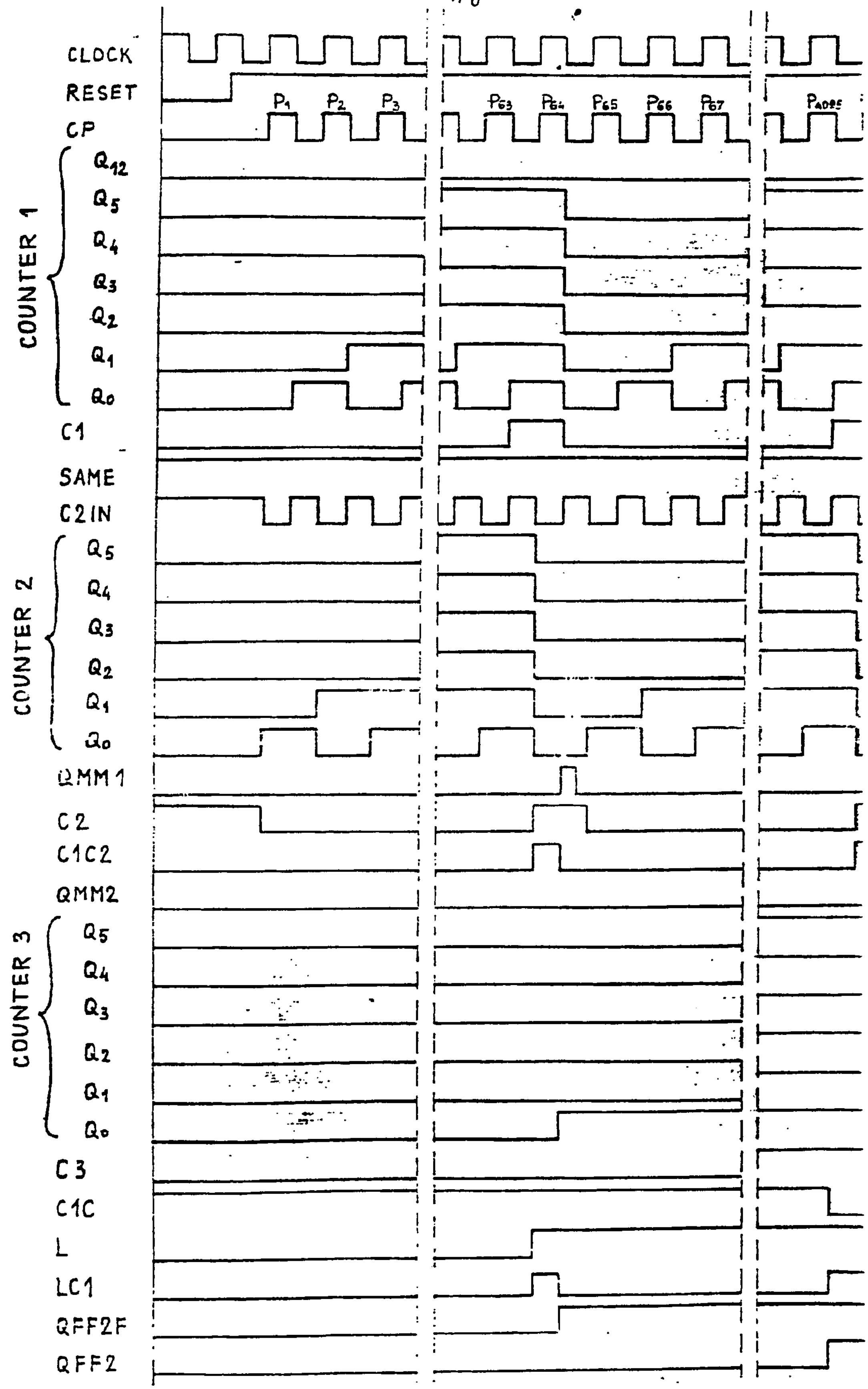
CLOCK
RESET
CP
P1 P2 P3
P63 P64 P65 P66 P67
P4095
COUNTER 1
Q12
Q5
Q4
Q3
Q2
Q1
Q0
C1
SAME
C2IN
COUNTER 2
Q5
Q4
Q3
Q2
Q1
Q0
QMM1
C2
C1C2
QMM2
COUNTER 3
Q5
Q4
Q3
Q2
Q1
Q0
C3
C1C
L
LC1
QFF2F
QFF2

Figure 11

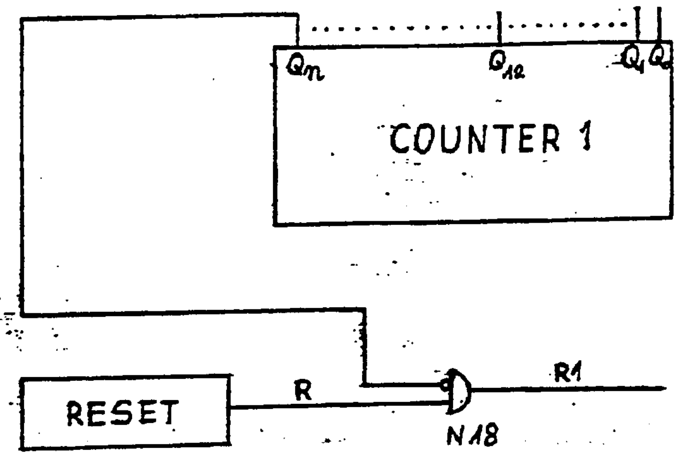

Figure 12

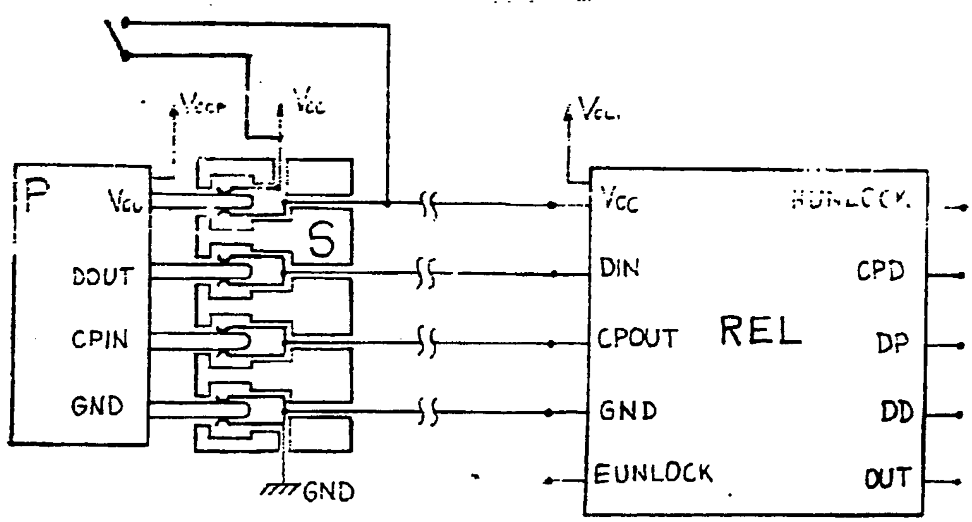

Figure 13

REMOTE ELECTRONIC LOCK AND ANTI-THEFT DEVICE

Mechanical locks can only boast of a comparably small number of combinations (several thousands or, at its utmost, several tens of thousands of combinations), which does not suffice. Moreover, any mechanical lock, regardless of whether its unlocking combination is set on a dial or requires some key or other information carrier providing information to be tested by the lock itself, both insertion of the information needed to open the lock and testing of this very information (whether it is the right one to open the lock or it is not) are performed in one place, accessible from outside, for the lock itself must also be accessible to information insertion. The flaw of such a solution can best be observed on an automobile contact lock. It is placed in the driver's cab and after being unlocked by an appropriate key it sets up necessary contacts inside its own case. In order to set up those contacts, one does not need to have the key that fits in the lock: it is enough to cut the wires coming out of the lock and connect them in the right way - a procedure mastered thus far by 12-year old children

In existing mechanical locks, information insertion and testing necessary to open them are performed in one place that has to be accessible, and an increase in the number of combinations corresponds to a great increase in complexity, size and price of those locks.

The existing electronic locks in most cases imply use of microprocessors and a discrete tenchnique of manufacture with numerous components, which unnecessarily increases their cost. The existing remote electronic locks base their remote effect on wireless transmission of the information needed to unlock them from a transmitter to a receiver which, together with a device for testing the information received, make a whole; therefore, both the receiver and the testing device are built into a place accessible to the signal, but also to .a thief (example: garage door remote electronic lock with ultrasonic information transmission, wherein both the receiver and the testing device must be built in so that the ultrasonic signal reaches them, ie they must be installed on the garage door or the doorpost, which makes them accessible to a thief as well); another way is to ensure remote effect as applied on the garage door contact lock, in which both insertion and testing of information are performed in the lock installed outside of the garage, so as to be accessible to the driver sitting inside his car, whereby after succssful testing a door opening device is activated through a long lead. This means that the opening signal is sent through the lead, so that the lock need not be unlocked:to cut the wires coming out of it and connect them is enough to have the garage open.

A digital electronic lock can have a large number of combination, the fact having a quite small impact on its price and complexity. The lock described herein, with opening information taking the form of a 64 - bit code (the code itself can be longer or shorter, without any considerable change in the lock's price), possesses over 1.8 x 10^{19}combinaitons.

Figure 1 presents parts of the Remote Electronic Lock (hereunder referred to as Lock), signal flow between them and the parts physical separation.

Figure 2 presents the use of the Lock as a contact lock to be applied in motor vehicles.

Figure 3 presents the logical diagram of the digital circuit to be built into plug.

Figure 4 presents one of the possible pin configurations in the active part of the Lock and one of the ways to connect it with the socket and the plug.

Figure 5 presents the modification of the ordinary relay which enables it to act as the cord locking unit, as well. The modified relay represents the Switching and Cord Locking Unit (SCLU) itself, but when fitted with the Lock (REL) it becomes the Remote Electronic Contact and Cord Lock (RECCL).

Figure 6 presents the way to use REL as an anti-theft device for any kind of electronic equipment, including a car stereo (CS). It also presents how to use two Locks and only one socket to protect both car stereo and the car from being stolen.

Figure 7 presents the logical diagram of the active part of the Lock with testing through EXNOR gate and counter, and with unlocking after the first successful testing.

Figure 8 presents the logical diagram of the active part of the Lock with testing by EXNOR gate and addressable LATCH, and with unlocking after the first successful testing.

Figure 9 presents the logical diagram of the active part of the Lock with testing by EXNOR gate and counter, and with unlocking only as long as testings last - these being successful to a certain percentage.

Figure 10 presents the logical diagram of the active part of the Lock with testing by EXNOR gate and addressable LATCH, and with unlocking only as long as testings last - these being successful to a certain percentage.

Figure 11 presents and signal diagram for all the versions of the lock.

Figure 12 presents modifications in formation of reset signal R necessary to use the Lock as a time-lock with reversed function.

Figure 13 presents modifications in the way REL is connected to a power supply to be used as a time-lock.

Symbols to be found in Drawings:

The Lock, parts of the Lock and some attachments

ACU	- Alarm Unit
AS	- space accessible to the user of the Lock
CS	- Car stereo
D	- Driver
ECHL	- Electrically Controlled Hood Lock
H	- Push-button for hood opening
LN	- Code testing logic
P	- Plug
PS	- Protected Space
RECCL	- Remote Electronic Contact and Cord Lock
RECL	- Remote Electronic Contact Lock
REL	- Remote Electronic Lock
S	- Socket
SCLU	- Switching and Cord Locking Unit
SIC	- Standard integrated circuit
ST	- Engine ignition push-button
starter	- Starter
SU	- Switching Unit

Terminals

CPD	- Terminal for disconnection of a built-in tact generator
CPIN	- Terminal for clock pulse input in a plug
CPOUT	- Clock pulse input-output terminal
DD	- Terminal for input of the code from built-in PROM
DIN	- Terminal for input of the code from plug's PROM

DOUT	- Output terminal of plug's PROM (also used for programming)
DP	- output terminal of lock's PROM (also used for programming)
ENABLE	- Enable terminal of standard integrated circuit
EUNLOCK	- Terminal for serial connection of several locks
GND	- Ground terminal
HUNLOCK	- Unconditional unlock terminal
OUT	- Output terminal of the lock
VCC	- Power supply
VCCP	- PROM power supply (used at programming)

Signals within the active part of the Lock
(in order of appearance in Figure 11)

CLOCK	- Tact generator signal
RESET	- Reset signal
CP	- Clock Pulse
C1	- Signal is high while outputs Q_0+Q_5 of COUNTER 1 are high
SAME	- Signal is high while corresponding bits of both codes are identical
C2IN	- Input signal of COUNTER 2
QMM1	- Signal for resetting of COUNTER 2 after the whole code has been read
C2	- Signal is high while outputs Q_0+Q_5 of COUNTER 2 are low
C1C2	- Signal is high while both signal C1 and signal C2 are high
QMM2	- Signal for resetting of COUNTER 3 after each 64 readings of the whole code
C3	- Output signal of gate N14 which determines the number of successful readings of the whole code necessary to unlock the Lock
C1C	- Signal is low while outputs Q_0+Q_{11} of COUNTER 1 are high
L	- Signal is high while LATCH outputs Q_0+Q_{63} are high
LC1	- Signal is high while both signal L and signal C1 are high
QFF2F	- Signal for final conditional unlocking of the Lock
OFF2	- Signal for temporary conditional unlocking of the Lock

NOTE: All clock pulse inputs CP of all counters and flip-flops, as well as A inputs or monostable multivibrators are active on the falling edge; B inputs of monostable multivibrators and LATCH clock pulse input CP are active on the rising edge; all reset inputs R and all set inputs S of flip-flops are active low.

Electronic circuits

CLOCK	- Tact generator
COUNTER 1	- Binary counter with 64 states (Figures 3, 5 and 6), or with 8192 states (Figures 7 and 8)
COUNTER 2	- Binary counter with 64 states
DRIVER	- Driver unit
FF1	- D flip-flop
FF2	- D flip-flop
LATCH	- Addressable LATCH
MM1	- Monostable multivibrator
MM2	- Monostable multivibrator
N1	- 2-input NAND gate
N2	- 2-input 3-state AND gate
N3	- 2-input EXNOR gate
N4	- 2-input AND gate with one inverting input
N5	-2-input OR gate with one inverting input
N6	- 2-input NAND gate
N7	- 6-input AND gate
N8	- 2-input NOR gate with one inverting input
N9	- 6-input NOR gate
N10	- 2-input AND gate
N11	- 2-input NAND gate
N12	- 64-input AND gate
N13	- 2-input NOR gate with one inverting input
N14	- 4-input AND gate
N15	- 6-input AND gate
N16	- 2-input NAND gate
N17	- 2-input AND gate
PROM	- Programmable ROM

RESET	- reset circuit
N18	- 2-input AND gate with one inverting input

FIGURE 1

Unlike the existing locks, this Lock does not base its remote activity either on remote transmission of the information needed to unlock it from its carrier to the receiving part of the Lock, or on remote transmission of the output signal (subsequent to the successful testing of input information), but on remote transmission of the complete information - from the receiving part of the Lock to the part in which input information undergoes testing. Therefore, the Lock is divided into two parts: the receiving one S (in this case - in the form of a socket, the passive part of the Lock) placed in space AS, accessible to the user, and the part for testing and activating the executive units REL (active park of the Lock) placed in sapce PS, protected by the Lock. In this way, access to connections through which these two parts of the Lock have been linked cannot result in unlockikng of the Lock, unless the user is familiar with the information (code) that is to be transmitted through this link to the active part of the Lock, placed anywhere within the volume (not on the surface) of the protected space. As information carrier, a key in the form of plug P is used.

FIGURE 2

The best way to apply this Lock is to use it as Remote Electronic Contact Lock RECL in motor vehicles. The part LN of the Lock for testing input information and the part D for activating the executive units, subsequently to the receipt of the information (the right one), activate an executive unit, in this case a switching unit SU, eg a relay that sets up or disconnects the electrical circuits in the vehicle. In order to prevent theft of the vehicle, the RECL lock should be installed into the engine compartment (even into a part inside the engine compartment), whereas the hood should be secured by an electrically controlled lock the electrical circuit of which is closed by push-button H placed in accessible place AS (driver's cab) only when the RECL lock is unlocked and when the relay SU sets up make contacts (one being the contact to start the engine, provided by push-button ST) and disconnects break contacts (to which an alarm control unit is attached), including possible alarm devices.

FIGURE 3

A compact electronic circuit (on a single chip, if possible) that is to be built into plug P consists of a programmable ROM memory (with 64 one-bit words) in which the information that unlocks the Lock is programmed in the form of a binary code, of binary counter COUNTER 1with 64 states, generating the address, and of a reset circuit with signal R, active low. The reset signal should last shorter than the reset signal in the active part of the Lock REL.

FIGURE 4

By plugging the plug P into the socket S, the compact electronic circuits, placed in the plug and in the part of the Lock intended for testing and activating executive units REL, are connected to power supply voltage, reset (whereby resetting of the plug is performed in shorter time), and clock pulses from the CPOUT terminal of REL reach the CPIN terminal of the plug P, pushing out the contents of the plug's PROM through the output terminal DOUT of the plug, bit by bit. Thus, the code coming out of the plug's PROM reaches the input terminal DIN of the Testing circuit (the terminal PD that serves to program the PROM placed in REL should be connected to the terminal DD subsequently to programming of this PROM).

In order that the driver sets up the output signal OUT after a successfully done testing, it is necessary that the input terminal EUNLOCK, that serves to possibly connect a number of looks into a sequence is at a low level. The input terminal HUNLOCK serves to unconditionally unlock the Lock and, if not used, should be brought to a high level (it is active low). The input terminal CPD serves to disconnect the clock pusle of the in-built tact generator: what is ensured thereby is programming of the PROM built into REL by an exterior tact-generator (whose impulses are brought to CPOUT terminal) in accordance with the protocol for PROM programming. The terminals Vccp served to supply power for the PROM's during programming; after programming is over, they are to be connected to the terminals Vcc. After programming, the REL terminal CPD is to be set to a low level (as it is only active low). When programming PROM in the plug, the DOUT terminal is used.

FIGURE 5

When this lock is used in cars, as a contact lock, it is essential to keep it in protected space. Instead of producing separate electrically controlled hood lock for each type of the car, it is possible to re-design the ordinary relay in such a way that it acts as a lock which locks the cord mechanical hood lock is controlled by from the cabin of the car. Ordinary relay is modified as shown in figure 5. The movable part of a relay 1, on which contacts 7 are fitted on, is provided with latches 2 (in this example two latches are used, but could be more or less) which latch the plate 3. The plate 3 moves inside of the relay in grooves provided in the case of a relay (if can be shaped in any way that enables it to be latched). On plate's right end a cord is screwed on (or fitted in any other way), and the other end is fitted with a short piece of a wire (or anything else suitble for the purpose) for the plate to be connected to the mechanical hood lock. The case of the relay is provided with a fitting 5 (of the same kind as a fitting 4 on the end of the cord) by which it is to be attached to a hood lock in the same way the cord is usually attached to a hood lock. The

case of the relay is also provided with a fitting 6 of the same type as a hood lock is provided with for the cord to be attached to it. So, the modified relay is attached to a hood lock in the same way as the cord is usually attached to the hood lock, and the cord is attached to the relay in the same way as as it is usually attached to the hood lock. This enables the modified relay to be used virtually with each and every type of existing hood locks.

The modified relay makes and brakes necessary contacts, and it locks the (cord or anything else attached to the plate or to any structure of any shape that performs the function of the plate as described here) which controls the hood lock, so it actually acts as the Switching and Cord Locking Unit, SCLU. When SCLU is fitted with REL, which controls it's electro-magnet, it functions as the Remote Electronic Contact and Cord Lock, RECCL.

FIGURE 6

Any electronic device (TV-set, video recorder, stereo system, ...) can be protected from being stolen by making it unusable for anyone but the owner, because in that case there is no reason to even try to steal it. One way to do it is to chose an electronic circuit or any other small part without which certain device can't work, and to design it in such a way that it can be plugged in and out of the device. So, when the owner has to leave the device unattended, he just takes the plug out, and the device is unusable. The flaw of this solution is that one plug will fit every device of the same kind, and that will make it economical for the thief to have them custom made for himself.

This problem can be solved as shown in left part of a figure 6, on example of the car stereo, CS. One (or more) electronic circuit the car stereo can't work without (the Standard Integrated Circuit, SIC) is chosen. On the same chip REL is made (it can be made on a separate chip and then connected with SIC and incapsulated in the same package) in such a way that SIC works only when REL is unlocked. Whole package is then built in the car stereo in a usual way, and joined with a socket mounted on the front panel (or somewhere else) for a plug-like key P to be plugged in. In this way one plug will fit only one device. HUNLOCK terminal of REL must be connected to Vcc terminal, and OUT terminal of REL must be connected to ENABLE terminal of SIC on the chip (or within the incapsulation) so that opening of device's case and meddling with circuitry won't give any results. When the car stereo is protected from the theft as described above, it is easy and cheap to protect the car itself from being stolen. The Remote Electronic Contact and Cord Lock should be fitted between the hood lock and the cord which controls the hood lock. It's CPD terminal should be connected to Vcc.

In this way the internal clock pulse generator will be disconnected, and the clock pulse will be taken from REL built in the car stereo (PROM's should be identifally programmed). This enables the plug P, plugged in the car stereo, to be used to unlock both locks (no additional plugs and sockets mounted in the fascia are needed). RECCL can be used (beside setting up contacts within the engine, and therefore acting as a car immobilisation unit) to turn on and off possible alarm unit.

FIGURE 7

The structure consisting of CLOCK, FF1, N1 and N2 lets through the first whole CLOCK impulse that appears after resetting, as well as all the succeeding ones, forming the signal CP. After resetting, there are on gate N3 bits of the codes programmed into PROM's at zero addresses. The first clock pulse P1 changes by its rising edge the state of COUNTER 2 if these bits are equal, and by its falling edge it alters the state of COUNTER 1 setting onto gate N3 the bits recorded in PROM's on the first address. This keeps being repeated all until the 64th clock pulse which by its rising edge gets COUNTER 2 (only in case all the bits tested have been identical two-by-two) into the initial state that rasies high the signal C2 at the output of gate N9. The signals C2 and C1 (formed in gate N7) are led to gate N10, on the output of which a signal C1C2 is formed which by its falling edge raises high (C2 is at high level) the output Q of circuit FF2 - thus, the high level signal QFF2F is maintained high (due to gate N11) all until power supply has ceased. If the terminals EUNLOCK and HUNLOCk are set up correctly, the signal QFF2F keeps the Lock unlocked, while singal OUT activates executive units. If all the bits have not shown two-by-two correspondence, signal C2 remains low, and signal C1 by its falling edge triggers the circuit MM1 which, by a narrow impulse QMM1, resets COUNTER 2, and the whole testing cycle continues anew.

The active part of the Lock made in this way keeps putting to test the input code all until the first successful testing, when the Lock is unlocked and remains so all until a disconnection of supply.

FIGURE 8

The formation of signal CP takes place as presented in figure 7. After resetting, there are in gate N3 bits of codes programmed into PROM's at zero address. The first clock pulse P1 by its rising edge programms the signal SAME into the zero address of the LATCH circuit, and by its falling edge alters the state of COUNTER 1, taking a pair of bits from the first address of PROM's into gate N3 and setting up the first address of LATCH. This keeps being repeated all until the 64th clock pulse that by its falling

edge programs signal L into circuit FF2 - the L is obtained at the output of gate N12 and will be high only if all the bits tested have shown two-by-two equality, when the output Q of circuit FF2 is raised high - thus, the signal QFF2F is maintained high (due to gate N11) all until power supply has ceased. If the terminals EUNLOCK and HUNLOCK are set up correctly, the signal QFF2F keeps the Lock unlocked, while signal OUT activates executive units.

If all the bits have not shown two-by-two correspondence, signal L remains low, and testing is continued.

The active part of the Lock made in this way keeps putting to test the input code all until the first successful testing, when the Lock is unlocked and remains so all until a disconnection of supply.

FIGURE 9

The formation of signals CP, SAME, C2IN, C2, C1, C1C2 and QMM1 takes places as presented in figure 7. COUNTER 1 in the active part of the Lock has 8192 states, and whenever the state of terminal Q_{12} IS altered, it triggers circuit MM2 that generates signal QMM2 which resets COUNTER 3. If triggering of MM2 were performed by the rising edge of signal C1C at the output of gate N16 and brought onto terminal B of circuit MM2, COUNTER 1 in the active part of the Lock could only have 4096 states (COUNTER 1 in the plug still has 64 states). The signal C1C2 that appears after each successful testing of the whole code alters the state of COUNTER 3 by its falling edge. Gate N14 determines the number of accurate testings of the whole code out of every 64 necessary to unlock the Lock (61 in this case). Signal C1C transmits the value of signal C3 onto the ooutput Q of circuit FF1 by its falling edge onto the falling edge of each 4095th clock pulse. Signal QFF2 keeps the Lock unlocked (if the terminals EUNLOCK and HUNLOC are set up correctly) only as long as successful testings - by 61 out of 64 successive ones of the whole code - last. The Lock made in this way ensures unlocking even when great disturbances in signal transmission appear, for by selection of gate N14, the percentage of accurate testings needed to unlock the Lock can be regulated. If gate N11 is attached to circuit FF2, as presented in Figures 7 and 8, the Lock will remain unlocked after the first successful testing of 61 out of 64 successive testings of the whole code.

FIGURE 10

The formation of a signals CP, SAME and L takes place as presented in figure 8, whereas the formation of signals C1, C1C, QMM2, C3 and QFF2 takes place as presented in figure 9. Signal LC1 appears in gate N17 and by its falling edge altes the state of COUNTER 3. The function fulfilled by the Lock

thus made is identical to the function of the Lock with the structure presented in figure 9. All remarks referring to COUNTER 1 apply here as well.

RECL can be used as simple alarm system for a car stereo, CS. The electronic key is built in CS, and it is connected with RECL which is built in the motor compartment, or somewhere else in the car. RECL is of type with continual testing of the code (figure 9, 10), and both RECL and the key are turned on all the time. If CS is removed, wires that join RECL and the key must be cut off, RECL gets locked and it switches the alarm unit (or just a horn) on. In this case the detection of CS being removed is not done by detecting the voltage drop, but by failure to provide the code for RECL to stay opened, what can be faked.

When used to make and brake electrical circuits within the engine of the car, the version of REL with gate N11 connected to FF2 should be used.

Wherever PROM is used, ROM or EPROM can be used if more suitable.

All the terminals in the active part of the Lock REL that are connected to the receiving part of the Lock S should be resistant to excess voltage, and the whole active part of the Lock should be made so as to prevent unlocking by intentional burn-out.

FIGURE 12

Personal electronic device (cameras, video cameras, personal stereos, etc) are quite often objects of theft. If they are made unusable to thiefs as shown in figure 6 (on example of a car stereo, CS), this still will not be enough. If, for example camera is snatched while being in use by it's owner, it will have it's electronic key plugged in, and it will be taken away together with a key.

For use in personal electronic devices, REL is modified as shown in figure 12. Changes made enable REL to function as a unique time-lock. Unlike ordinary time-locks which can't be unlocked for certain length of time, this one once unlocked stays unlocked for certain length of time. In this way, it is possible to use electronic key to unlock REL, unplug it and leave it behind (at home, in a hotel, in a car, etc) while personal electronic device can be carried on and used for preset length of time. If it is stolen, after a present length of time REL will reset itself, and therefore lock itself up making personal electronic device unusable. This feature can be used in the rental business too, inforcing return of a device rented after lapse of a rental time and making theft through giving false name and address pointless.

Time function of REL is obtained by enlarging. COUNTER 1 to a required number of states that will (considering frequency of a clock) provide desired interval of time. One of outputs of COUNTER 1 (can be more than one) is used to provide reset signal R1 to REL after lapse of chose interval of time. It is connected to inverted input of N18 gate on which output reset signal R1 is formed. The other input of N18 gate is connected to reset circuit RESET.

FIGURE 13

To enable a time function of REL after removal of electronic key from a socket, a switch is provided to maintain a connection to a power supply. Electronic key should be plugged in while a switch is off, and it should be removed after switch is turned on. Alternatively, REL can be connected to a power supply permanently, with a push button provided to cut it for a moment after a key is inserted (to reset REL).

Versions of REL shown in figure 7 and 8 are suitable to be used as time-locks.

CLAIMS

1. A Remote Electronic Lock and Anti-theft Device comprising an active part REL (code testing logics LN and driver D for driving units SU) and of a receiving part (contact socket S), between which serial transmission of the information needed to unlock the Lock code contained in a plug P playing the role of a key) takes place, whereby the receiving part is placed in space AS, accessible to the user, and the active part REL is placed in space PS, access to which is protected by the Lock.

2 A Remote Electronic Lock and Anti-theft Device as claimed in Claim 1 wherein the Lock protects itself and engine compartment of a car by controlling or blocking an electrically or mechanically operated hood lock.

3 A Remote Electronic Lock and Anti-theft Device as claimed in claim 1 or claim 2, wherein the Lock protects itself and engine compartment of a car by blocking, locking or latching a cord which operates a mechanical hood lock.

4 A Remote Electronic Lock and Anti-theft Device as claimed in claim 3, wherein a cord is locked through a relay (or any other electro-mechanical device fit for a purpose) which is modified in such a way that it's armature beside making and breaking contacts latches an additional plate (or rod, or any other structure fit for a purpose) which is made to slide through relay's case and is to be connected between a mechanical hood lock and a cord which operates a hood lock.

5 A Remote Electronic Lock and Anti-theft Device as claimed in any preceding claim wherein the Lock itself or a relay controlled by the Lock is used as an engine immobilization unit.

6 A Remote Electronic Lock and Anti-theft Device as claimed in any preceding claim wherein the Lock is made on the same chip with any other electronic circuit (or on a different chip, but within the same encapsulation) in such a way, that it disables it while locked (all accessable terminals of the Lock are to be made resistant to excess voltage and intentional burn-out in the sense that this cannot enable unlocking of the Lock).

7 A Remote Electronic Lock and Anti-theft Device as claimed in any preceding claim wherein it's made in a way which enables it to be used as a reversed time lock (once unlocked it stays unlocked for a preset length of time).

8 A Remote Electronic Lock and Anti-theft Device substantially as described herein with reference to all figures of the accompanying drawing.

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